

1 **CLAIMS**

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3 1. A tool for circulating fluid in a well bore, the tool
4 comprising a tubular assembly having a through
5 passage between an inlet and a first outlet, the
6 inlet and first outlet being adapted for connection
7 in a work string, a second outlet extending generally
8 transversely of the tubular assembly; an obturating
9 member moveable between a first position closing the
10 second outlet and a second position permitting fluid
11 flow through the second outlet, the obturating member
12 including restraining means to actively retain the
13 obturating member independently in the first and the
14 second positions; an engagement mechanism actuatable
15 between an engaged configuration, in which the
16 obturating member is locked in one of the first or
17 second positions; and a disengaged configuration in
18 which the obturating member can move to the other of
19 the first and second positions; a fluid pressure
20 actuation surface coupled to the engagement mechanism
21 and biased by a spring located between the tubular
22 assembly and the engagement mechanism; wherein
23 variation of fluid pressure on the actuation surface
24 controls actuation of the engagement mechanism and
25 stroking the tool in the disengaged configuration
26 moves the obturating member.

- 27
- 28 2. A tool as claimed in Claim 1 wherein the obturating
29 member comprises a sleeve axially slid able within the
30 tubular assembly.
- 31
- 32 3. A tool as claimed in Claim 1 or Claim 2 wherein the
33 restraining means is a collet.

- 1
- 2 4. A tool as claimed in Claim 3 wherein the collet is
- 3 retainable in a plurality of recesses on the tubular
- 4 assembly.
- 5
- 6 5. A tool as claimed in any one of the previous claims
- 7 wherein the fluid pressure actuation surface is
- 8 located on an actuator sleeve axially slidale within
- 9 the tubular assembly.
- 10
- 11 6. A tool as claimed in Claim 5 wherein a portion of the
- 12 actuator sleeve is located across the collet.
- 13
- 14 7. A tool as claimed in any one of the previous claims
- 15 wherein the engagement mechanism comprises mutually
- 16 engageable formations on each of the actuator sleeve
- 17 and the tubular assembly.
- 18
- 19 8. A tool as claimed in Claim 7 wherein the formations
- 20 comprise a pin and a groove.
- 21
- 22 9. A tool as claimed in Claim 8 wherein the groove is
- 23 continuous so that the pin can travel in a continuous
- 24 cycle around the groove.
- 25
- 26 10. A tool as claimed in Claim 9 wherein the groove
- 27 comprises a plurality of apexes and bases such that
- 28 the pin moves longitudinally to the tubular assembly,
- 29 for at least a portion of the cycle.
- 30
- 31 11. A tool as claimed in any one of the previous claims
- 32 wherein the second outlet comprises a plurality of

1 ports in the tubular assembly which communicate with
2 the inlet.

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4 12. A tool as claimed in Claim 11 wherein the ports are
5 distributed circumferentially around the outer
6 surface of the tubular assembly.

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8 13. A tool as claimed in any one of the previous claims
9 wherein the cross-sectional area of the first outlet
10 is greater than the cross-sectional area of the
11 second outlet.

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13 14. A method for circulating fluid in a well bore, the
14 method comprising the steps:

15 (a) inserting a work string into the well bore, the
16 work string having a fluid inlet, a first fluid
17 outlet and a second fluid outlet, an obturating
18 member which is moveable between a first and
19 second position to respectively close and open
20 the second fluid outlet, and an engagement
21 mechanism which when engaged locks the
22 obturating member in one of the first or second
23 positions;

24 (b) varying the fluid pressure through the work
25 string to move the engagement mechanism between
26 locked and unlocked configurations; and

27 (c) stroking the work string to move the obturating
28 member between the first and second positions.

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30 15. A method as claimed in Claim 14 wherein varying the
31 fluid pressure through the work string is achieved by
32 pumping fluid through the work string.

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- 1 16. A method as claimed in Claim 15 wherein the method
- 2 includes the step of running the work string in a
- 3 closed and locked configuration with the pumps turned
- 4 off.
- 5
- 6 17. A method as claimed in Claim 15 or Claim 16 wherein
- 7 the method includes the step of drilling with the
- 8 work string in a closed and locked configuration and
- 9 in compression while pumping fluid.
- 10
- 11 18. A method as claimed in Claims 15 to 17 wherein the
- 12 method includes the step of back reaming with the
- 13 work string in a closed and unlocked configuration
- 14 and in tension while pumping fluid.
- 15
- 16 19. A method as claimed in Claims 15 to 18 wherein the
- 17 method includes the step of opening the second outlet
- 18 with the work string in tension with the pumps off.
- 19
- 20 20. A method as claimed in Claims 15 to 19 wherein the
- 21 method includes the step of stroking the work string
- 22 in a locked and open configuration while pumping
- 23 fluid.
- 24
- 25 21. A method as claimed in Claims 15 to 20 wherein the
- 26 method includes the step of stroking the work string
- 27 in a locked and open configuration with the pumps
- 28 off.
- 29
- 30 22. A method as claimed in any one of Claims 14 to 21
- 31 wherein the method includes operating the work string
- 32 in a cyclic manner through the following
- 33 configurations:

- 1 (a) locked closed;
- 2 (b) unlocked closed;
- 3 (c) unlocked open;
- 4 (d) locked open;
- 5 (e) unlocked open; and
- 6 (f) unlocked closed.